

greatly cultivated in Germany, and the instruments connected with it (whose nomenclature, by the way, seems unusually bristling and difficult) offer many novel points for consideration. The mechanism of circulation and respiration in the animal subject is studied by means of a variety of delicate apparatus, and we note also some good schematic representations in which the movements are reproduced mechanically. The anatomist and histologist will find many beautifully prepared specimens from animal and plant life.

Leaving the biological section we enter that of geography, geology, and the allied sciences. Here the instruments used by the late Dr. Livingstone in his last journey possess a melancholy interest; they comprise a pocket chronometer, a sextant, hypsometrical boiling apparatus, and three thermometers. Specimens are shown of the dredging, sounding, and other apparatus that have been used on board the *Challenger*, the *Porcupine*, and other exploring vessels. The collection of maps is a large one; in it will be found a selection designed to illustrate the progress of cartography and surveying in India, the maps of the Geological Survey of this country, &c.; also the MS. maps of Livingstone, Burton and Speke, Baker, Stanley, and others. In a glass case may be observed several open log-books. One is Capt. Cook's log of the *Endeavour* in his voyage round the world (1768-71), another is that of one of his later voyages; another, the log of the proceedings of the *Bounty*, including an account of the mutiny. The subject of geology is largely illustrated by sections, maps, models, and specimens. We only note here the illustrations of the recent Sub-Wealden boring. There are numerous fine models in illustration of crystallography, and one of the goniometers exhibited is that of the Abbé Haüy. Among the objects connected with mining may be noted the apparatus constructed by Sir Humphrey Davy in his researches on the safety lamp.

The section of Applied Mechanics, which we have left to the last, might well claim a separate paper or a series of such. We can do no more than briefly refer to the collection of James Watt's models, which indicate, e.g., the progress of his thoughtful labour in connection with the idea of separate condensers, and the expansive working of steam. In Watt's first engine great difficulty was experienced in fitting the piston accurately to the cylinder. Such difficulties exist no longer; and a remarkable example of the skill now attained in metallic constructions is afforded in the fine surface plate lent by Sir J. Whitworth; this is probably the closest approximation to an absolutely plane surface that has yet been realised. Finally, the old "Rocket" constructed by Stephenson in 1829, and the original engine of Henry Bell's steamboat, appear in this collection, the venerable quondam precursors of a great social revolution.

#### PREJEVALSKY'S MONGOLIA

*Mongolia, the Tangut Country, and the Solitudes of Northern Tibet.* By Lieut.-Colonel N. Prejevalsky, Translated by E. Delmar Morgan, F.R.G.S. With Introduction and Notes by Colonel Henry Yule, C.B. (Sampson Low and Co., 1876.)

WE have had occasion once or twice to refer briefly to Col. Prejevalsky's travels in Eastern High Asia, and some of our readers may have seen more or

less detailed notices of his journey in the German and English geographical journals. These have been sufficient to show that the narrative of the Russian officer is of unusual value, and we are therefore thankful that not much time has been lost in making it accessible to the English public, to which Russian is practically an unknown tongue. The two volumes before us, however, contain only Col. Prejevalsky's general account of his expedition; and we regret that there seems to be no intention of making the special scientific results accessible to English readers. Judging from what is contained in the two volumes before us, these must be of the highest importance, and we hope that by some means they will be made known to English men of science.

The present translation has been brought out with great care. Mr. Delmar Morgan has put the narrative into clear and idiomatic English, which, we have reason to believe, faithfully represents the original Russian. He has, moreover, added to the value of the narrative for English readers by numerous supplementary and foot notes. We consider that both Col. Prejevalsky and the English reader are particularly fortunate in having the advantage of Col. Yule's knowledge to supplement and correct the original narrative. In an introduction he connects the journey of the Russian officer with those of previous explorers in Central and Eastern Asia, and especially with that of the well-known Huc and his companion Gabet. Considerable discredit has been thrown on the narrative of Huc, but Col. Yule shows that in the main it may be regarded as trustworthy, allowance being made for the missionary's love of exaggeration and his desire to produce effect. Prejevalsky's journey from Peking to the south-west into Tibet coincided to some extent with that of Huc, and the former on several occasions impugns the accuracy, if not the veracity, of the latter. Those who are familiar with the old Abbé's delightful narrative will be glad to know that so great an authority as Col. Yule thinks that after all he is in the main trustworthy. Col. Yule's numerous notes will, moreover, be found to add much to the value of the work, both as supplementary to the main narrative and as corrective of occasional statements by Col. Prejevalsky arising from imperfect knowledge or rashness. This narrative Col. Yule shows, is an additional confirmation of the remarkable accuracy of that of Marco Polo.

The starting-point of Col. Prejevalsky's expedition was the town of Kiakhta, on the border of Siberia and Northern Mongolia, from which the small party set out in November, 1870, and returned to it after having done three years' hard and fruitful work, in October, 1873. The expedition seems to have been essentially a Government one, sent out at the instigation of the Russian Geographical Society. It is, therefore, difficult to understand how Col. Prejevalsky should have been so seriously hampered from want of sufficient funds. Yet so it was; the resources at the leader's command were a mere pittance as compared with the magnitude of the undertaking. The entire party consisted only of the Colonel, a companion, and two Cossacks, and the instrumental equipment was the most meagre possible. All things considered, it is marvellous that the results achieved were so many and so valuable. From Kiakhta the party went by Urga across the desert of Gobi, probably the dreariest desert in the world, to

Kalgan, and hence to Pekin. From Pekin a preliminary tour was made to the north, to Lake Dalai-nor, one object being to observe the spring flight of the birds of passage. This is a subject in which Col. Prejevalsky takes great interest, and throughout the whole extent of his journey he continued to make observations on the migrations of birds, and the present volumes contain many valuable notes on the subject. Lake Dalai-nor, which like many other lakes in this region, is salt, is described as a great rendezvous for migratory birds. The flight and habits of these birds are described fully in the more strictly scientific part of Col. Prejevalsky's account of the expedition, which is not included in the present translation. There is, however, a list of the various birds observed at this lake. In this, as in subsequent parts of his journey, Col. Prejevalsky noted as far as possible all the important features and products of the country as he proceeded. Surveying, however, was attended with many difficulties, on account of the suspicions of the natives, Chinese and Mongols, and it was only by stealth and by resorting to various artifices that Col. Prejevalsky could make use

of his note-books. Another cause of difficulty and especially of delay was the insurrection of the Chinese Mohammedans, who had overrun and devastated much of the country through which Col. Prejevalsky's expedition passed.

On returning to Kalgan the expedition commenced the serious part of the undertaking, proceeding westwards by the In-shan Mountains, and crossing the Hoang-ho at Bauta, near the centre of its great northern bend. Proceeding along the left bank of the river through the country of the Ordos, the party recrossed the Hoang-ho at Ding-hu, into the Ala-shan country, and were well received by the prince at Din-yuan-ing. A number of days were spent here hunting and exploring among the Ala-shan mountains; but want of funds compelled the expedition to return to Kalgan. The return route was along the left side of the northern bend of the Hoang-ho, through the Khara-narin-ula mountains, where the cold experienced was quite Arctic. After staying a couple of months at Kalgan, the party again set out, this time fortunately much better equipped. They followed



FIG. 1.—The Gobi Plateau.

pretty much the same route as on their return, until they again reached Din-yuan-ing, where their reception was by no means so hospitable as on the previous occasion. Fortunately they fell in here with a caravan of Tangutans bound for the Lama Monastery of Chobsen, within a short distance of Lake Koko-nor, the great goal of Col. Prejevalsky's efforts. After many attempts to prevent it on the part of the prince of Din-yuan-ing, the party set out with the Tangutan caravan, and, notwithstanding the country being overrun with the Dungans or Mohammedan rebels, Chobsen was safely reached. This monastery is about forty miles north of Sining-fu, on the south-western slope of the mountains bordering on the Tatung river, which lie to the north-east of Lake Koko-nor, and form part of the southern boundary of the Desert of Gobi. Among these mountains a considerable time was spent in hunting and making collections in natural history. The party "also investigated, *de visu*, for the first time it is believed in modern history, the famous rhubarb plant in its native region." The inadequacy of his means compelled Col. Prejevalsky reluctantly to give up the idea of

penetrating as far as Lhasa. The basin of Lake Koko-nor was, however, explored, and the travellers pushed on to the south-west, through the region of Tsaidam, which is described as a vast salt-marsh covered with reeds, as if recently the bed of a great lake, and is said by the Chinese to stretch west and north to Lake Lob. Col. Prejevalsky proceeded as far as the lofty and uninhabited desert of Northern Tibet, turning at the upper stream of the great Yang-tse-Kiang, here called by the Mongols the Murui-ussu.

The party retraced their steps leisurely as far as Din-yuan-ing, where they arrived in a most worn and ragged condition. After a rest here they set out to attempt what was probably the most arduous part of their undertaking, the crossing of the heart of the great desert of Gobi from south to north, a feat never before attempted by any European. "This desert is so terrible, that in comparison with it the desert of Northern Tibet may be called fruitful. There, at all events, you may find water and good pasture-land in the valleys; here there is neither the one nor the other, not even a single oasis;



everywhere the silence of the Valley of Death." Kiakhta was reached on October 1, 1873.

Such is a very brief outline of the route traversed by the small expedition under Col. Prejevalsky. It gives no idea of the amount of work done, and the many difficulties which had to be overcome. Though the Colonel had a pass from the Chinese Government, it was not of much use to him. At almost every stage obstructions were thrown in his way, and had the party not been able to obtain a living by their guns they would either have had to starve or turn back. The whole distance traversed was upwards of 7,400 miles.

Col. Prejevalsky's object was not simply to get over a certain amount of ground. In many respects he is well qualified to conduct a scientific exploring expedition. Not only is he skilled in all kinds of surveying work necessary to map a country, but has evidently a good



FIG. 2.—Mongol Girl.

knowledge of geology, and is above all an accomplished zoologist and botanist. At every stage he stops to describe deliberately the natural features of the region, its inhabitants, its history, and to give long lists of the animals and plants collected. Some idea of the importance of the expedition from a scientific point of view may be learned from the fact that the plants collected amounted to 5,000 specimens, representing upwards of 500 species, of which a fifth are new. But especially important was the booty in zoology, which is Prejevalsky's own specialty, for this included thirty-seven large and ninety smaller mammals, 1,000 specimens of birds, embracing 300 species, 80 specimens of reptiles and fish, and 3,500 of insects.

It would be impossible within the space of a notice like the present to give any adequate idea of the kind and

amount of information contained in these volumes. No such keen-sighted and accomplished traveller has been over the same ground before. We shall endeavour to indicate a few of the points referred to. In the Introduction, besides the matters already referred to, Col. Yule adduces strong proofs for the existence of the wild camel on the north-west borders of China, and gives a few valuable notes on the real nature of Tibetan Lamaism. The Gobi desert, both in its eastern and central positions, is at last described with something like adequacy; it is probably one of the dreariest tracks on the face of the earth. One of the strong features of the book is its ethnology; all the groups of people passed through are described in detail. A whole chapter is devoted to the Mongols, containing minute particulars as to their manners and customs. In the same way many important notes are given concerning the Chakhars, the Ordos, the Olut or Ala-shan Mongols, the Tangutans, and the Dungsans or Tungani. A large space is devoted to an account of the Mongol camel, in which some points are brought out that will be new to many; and the Argali (*Ovis argali*) and its habits are described in considerable detail, as also the White-breasted Argali of Northern Tibet (*Ovis poli*). Geographers will find some valuable information concerning the present course of the northern bend of the Hoang-ho, which is many miles south of that which is found on many modern maps. There seems to be now only one main channel, the two northern ones being dry. Many evidences are adduced to show that much of the region through which the expedition travelled was at one time an inland sea; most of the lakes are salt, and the country of Ala-shan seems to be one great desert of sand and clay mixed with salt. Col. Prejevalsky mentions an interesting fact showing how particular may grow into general terms. He tells us that the Mongols apply the term "Russian" to all Europeans, and affix "French" or "English" as they wish to designate either of these nations. They also believe the latter to be vassals and tributaries of the former, and Col. Prejevalsky mentions several circumstances tending to show the great opinion of Russian power held by the inhabitants of Central Asia. Lake Koko-nor and the region around it, as well as the province of Kan-su generally, in which the expedition spent many months, are described in all their aspects with the greatest minuteness.

But it is needless to attempt to give any adequate idea of the contents of these two volumes; they are a perfect mine of information about the whole of the little-known region visited by Col. Prejevalsky and his companions. The work is a fine example of what the narrative of a scientific exploring expedition should be, and although Col. Prejevalsky delivers "a plain unvarnished tale," his work is full of interest from beginning to end, even for the omnivorous "general reader." The map which accompanies the work is on a large scale and is filled in with such minuteness as to present a satisfactory bird's-eye view of the principal results of the expedition, and the illustrations are both attractive and useful. To quote the words of Col. Yule, "the journey and its acquisitions form a remarkable example of resolution and persistence amid long-continued toil, hardship, and difficulty of every kind, of which Russia may well be proud."